

Executive Summary

Rwanda NCD Mobile Phone Survey

1. Overview

This report summarizes results from the Rwanda Noncommunicable Diseases (NCD) Mobile Phone Survey implemented in October - November 2022. NCDs are the leading cause of death worldwide and according to the World Health Organization country profiles in 2019, NCDs contribute to 50% of all deaths in the United Republic of Rwanda [1]. Efficient monitoring and surveillance are cornerstones to track the progress of NCD burden, related risk factors, and policy interventions. The systematic monitoring of risk factors to generate accurate and timely data is essential for Rwanda's ability to prioritize crucial resources and make sound policy decisions to address the growing NCD burden. With increasing access and use of mobile phones globally, opportunities exist to explore the feasibility of using mobile phone technology as an interim method to collect data and supplement household surveys.

In the survey, 4,483 individuals subscribed to MTN and Airtel/Tigo mobile phone networks anonymously participated in the survey using short message service (SMS, text messaging).

The survey was the culmination of significant work by the United Republic of Rwanda's Ministry of Health, including but not limited to study ethical review approval from the Rwanda National Ethics Committee, telecommunications approval from the Rwanda Utilities Regulatory Authority, agreements with mobile network aggregators, and data hosting. The Ministry of Health led questionnaire development, sampling, the mass media campaign, and data collection. Technical assistance was provided by the US Centers for Disease Control and Prevention, RTI International, and InSTEDD. Bloomberg Philanthropies Data for Health Initiative provided financial support through the CDC Foundation.

This report is structured as follows:

- Goals (Section 2)
- Design and Implementation (Section 3)
- Results (Section 4)
- Conclusions (Section 5)

2. Goals

The goal of the Rwanda Mobile Phone Survey (MPS) was to provide nationally representative estimates of indicators that can provide information on NCDs to help make programmatic recommendations to improve and enhance NCD prevention and response in the country. The results may be used to supplement results of key behavior risk factors assessed in the WHO Stepwise survey or other national surveillance systems.

The NCD MPS included 35 core questions on the following topics:

- Demographics
- Tobacco Use
- Alcohol Use
- Diet (Salt, Fruit, and Vegetable Consumption)
- Hypertension
- Physical Activity

3. Design and Implementation

3.1 Design

The design parameters used for the NCD MPS are shown below in Table 1.

Table 1. MPS Design

<i>Component</i>	<i>Design</i>
Mode	SMS
Sample	A two-phase sample of mobile phone numbers generated via random digit dialing (RDD), using the mobile phone prefixes for MTN and Airtel/Tigo. Rwanda stratified by age and sex in the second phase.
Number of Interviews	4,483 interviews, allocated proportionally across strata to the general population distribution.
Strata	6 strata, created by crossing sex (male, female) with age categories (18-29, 30-44, 45+)
Questionnaire	The NCD MPS questionnaire consisting of 35 core questions and administered in three languages (Kinyarwanda, French, English).
Contact times	All 7 days of the week, between 8am and 8pm each day
Contact attempts	<ul style="list-style-type: none"> • Contact #1: SMS • Contact #2: SMS, 26 hours after Contact #1 • Contact #3: SMS, 26 hours after Contact #2
Cost to Respondents	None.
Incentives	FRW 1.000
Tool and Hosting	Surveda, with data hosted at the Rwanda Ministry of Health

3.2 Implementation

The Rwanda NCD MPS implementation process consisted of four stages: Planning and Pre-Test, Full-scale Data Collection, Data Management and Analysis, and Data Release and Use.

Full-scale data collection commenced on October 12th, 2022 and was completed on November 21st for Airtel/Tigo subscribers (data collection was paused from November 2nd through the 7th). Data collection for MTN ran from October 24th to November 18th. A total of 4,483 adults aged 18 years and older completed or partially completed the survey through the two mobile network operators.

4. Results

This section presents the following results:

- Demographics and Response Rates (section 4.1)
- Tobacco Use (section 4.2)
- Alcohol Use (section 4.3)
- Diet (section 4.4)
- Hypertension (section 4.5)
- Physical Activity (section 4.6)

4.1. Demographics and Response Rates

The Rwanda MPS included 4,483 interviews across six age by sex groups. Table 2 shows the mobile phone demographic distribution compared to the UN population national statistics for sex and age. Results presented for the sections on tobacco and alcohol use, diet, hypertension, and physical activity are restricted to respondents who were 18-110 years of age.

Table 2. Mobile Phone Demographics

	<i>Mobile Phone Sample</i>	<i>National</i>
	4,483	7,250,826
Sex		
Male	51.9%	47.5%
Female	48.1%	52.5%
Age		
18-29	43.9%	38.8%
30-44	38.9%	35.1%
45+	17.2%	26.1%

By the end of data collection, all strata sample sizes were achieved, except for 45+ males (89.0% filled) and females (37.4% filled).

To achieve the 4,483 interviews, we sent invitations to 360,740 mobile phone numbers over the course of both the pre-test and full-scale survey. Out of these, 29,127 provided some sort of response but only 22,285 consented and provided the age and sex information necessary to be eligible to participate. Of these, 1,210 were ineligible due to age, and 16,152 respondents of eligible age were rejected due to stratum sample size being full. The result was 4,923 eligible respondents, of which 4,483 provided interviews (completed or partial). The interview rate was 91.1% (4,483/4,923) and the overall response rate was 5.6%, which is described in detail below. The final disposition codes for this sample are shown in Table 3.

Table 3. Final disposition codes for all dialed mobile phone numbers.

Disposition	Definition	N	Percent
1. Complete	Answered all survey questions	4,057	1.1%
2. Partial	Answered at least five questions but did not finish the survey	426	0.1%
3. Breakoff: Eligible	Answered age and sex questions but did not answer 5+ questions	440	0.1%
4. Ineligible: Age	Under age 18	1,210	0.3%
5. Ineligible: Quotas	Answered age and sex questions but quotas were full	16,152	4.5%
6. Refused	Refused consent	5,172	1.4%
7. Breakoff: unknown eligibility	Answered some questions but stopped before completing eligibility	1,670	0.5%
8. No answer	No answer, possibly nonworking number	331,613	91.9%
Total		360,740	100.0%

In this project, the sampling design involved two Phases. Each phase had a response rate. The final response rate was the product of Phase I and Phase II response rates.

$$\text{Phase I Response Rate} = \frac{\text{Number MPNs screened}}{\text{Number MPNs dialed}}$$

Or,

$$\text{Phase I Response Rate} = \frac{22,285}{360,740} = 6.17\%$$

$$\text{Phase II Response Rate } RR6_s = \frac{IP_s}{IP_s + O_s}, \text{ for stratum } s.$$

RR₆ was derived from the 2016 Standard Definitions of the [American Association for Public Opinion Research \(AAPOR\)](#). Phase II stratum-specific response rates (RR #6) are in Table 4.

Table 4. Phase II response rates for stratum s

Age	Males	Females
18-29	RR ₆₁ = 92.6%	RR ₆₂ = 91.4%
30-44	RR ₆₃ = 90.4%	RR ₆₄ = 90.7%
45+	RR ₆₅ = 89.3%	RR ₆₆ = 90.8%

The overall response rate is the product of Phase I and Phase II response rates, resulting in an overall response rate for the entire NCD MPS in Sri Lanka:

$$RR6_{overall} = \frac{IP_{overall}}{IP_{overall} + O_{overall}} * RR_{Phase I} = \frac{4,483}{4,483 + 440} * 0.0617 = 5.62\%$$

4.2. Tobacco Use

Tobacco use is one of the most important risk factors for NCDs, shared across the world's four leading NCDs: cardiovascular disease, diabetes, cancer, and chronic respiratory diseases. Overall, 5.4% of Rwandan adults aged 18 years and older currently used some form of tobacco (6.6% among men and 4.3% among women). Overall, 4.5% of Rwandans reported being current tobacco smokers. Men reported higher rates of current tobacco smoking than women, 5.6% and 3.4%, respectively. Men also reported higher rates of daily tobacco smoking compared to women (2.9% vs. 1.2%, respectively). Overall, 1.6% reported current smokeless tobacco use (1.7% among men and 1.5% among women).

For environmental exposure to tobacco smoke, almost 1 in 4 adult Rwandans reported exposure to tobacco smoke in their home (23.0%, 26.5% for men and 19.8% for women). Overall, 14.5% reported exposure to tobacco smoke while at work (17.4% for men and 11.7% for women). Table 5 shows key outcomes from the NCD MPS on tobacco use.

Table 5. Tobacco use overall and by sex

Tobacco Use	Overall		Males		Females	
	% (95% CI)		% (95% CI)		% (95% CI)	
<i>Tobacco Smokers</i>						
Current tobacco smokers	4.5	(3.9 , 5.1)	5.6	(4.7 , 6.6)	3.4	(2.7 , 4.4)
Daily tobacco smokers	2.0	(1.6 , 2.5)	2.9	(2.3 , 3.7)	1.2	(0.8 , 1.9)
<i>Smokeless Tobacco Users</i>						
Current smokeless tobacco users	1.6	(1.2 , 2.0)	1.7	(1.3 , 2.4)	1.5	(1.0 , 2.1)
<i>Tobacco Users (any use)</i>						
Current tobacco users	5.4	(4.7 , 6.1)	6.6	(5.6 , 7.7)	4.3	(3.4 , 5.3)
<i>Tobacco Smoke in Home or Work</i>						
Tobacco smoke in home	23.0	(21.8 , 24.4)	26.5	(24.8 , 28.4)	19.8	(18.0 , 21.8)
Tobacco smoke at work	14.5	(13.4 , 15.6)	17.4	(15.9 , 19.0)	11.7	(10.3 , 13.3)

4.3. Alcohol Use

Approximately two in five adult Rwandans consumed alcohol in the past 12 months (43.8%), with men reporting current alcohol consumption 1.5 times more frequently than women (54.9% vs. 33.4%),

respectively). Of those who consumed alcohol in the past 12 months, one in ten (10.9%) reported consuming alcohol daily over the past 12 months, with 11.6% and 9.8% of men and women reporting this behavior, respectively. For men, the most common frequency of alcohol consumption was 3-6 days per week (28.3%) while for women, the most common frequency was less than once per month (35.2%). Approximately three in ten (32.1%) adult Rwandans reported consuming alcohol in the past 30 days, with men being two times more likely to report this when compared to women (43.7% and 21.4%, respectively). Table 6 shows reported alcohol use overall and by sex from the NCD MPS.

Table 6. Alcohol use overall and by sex

Alcohol Use	Overall		Males		Females	
	% (95% CI)		% (95% CI)		% (95% CI)	
Alcohol use in the past 12 months	43.8	(42.2 , 45.3)	54.9	(52.8 , 57.0)	33.4	(31.2 , 35.7)
Alcohol Frequency among users in the past 12 months						
Daily	10.9	(9.4 , 12.4)	11.6	(9.8 , 13.4)	9.8	(7.2 , 12.3)
3-6 days per week	25.1	(23.1 , 27.2)	28.3	(25.8 , 30.9)	20.3	(17.0 , 23.6)
1-2 days per week	17.9	(16.1 , 19.7)	18.6	(16.4 , 20.8)	16.8	(13.8 , 19.9)
1-3 days per month	20.0	(18.1 , 21.9)	21.4	(19.1 , 23.7)	17.9	(14.7 , 21.1)
Less than once per month	26.1	(24.0 , 28.2)	20.1	(17.9 , 22.3)	35.2	(31.3 , 39.2)
Current alcohol users (past 30 days)	32.1	(30.7 , 33.5)	43.7	(41.7 , 45.8)	21.4	(19.4 , 23.4)

4.4. Diet

Regarding salt consumption, one in three (33.4%) adult Rwandans always or often added salt in some form to food when cooking or preparing foods. Overall, 26.2% of adult Rwandans reported always or often adding salt or salty seasoning before eating. About one in ten, (12.4%) reported always or often eating processed foods high in salt.

For fruit and vegetable consumption, over nine out of ten (96.4%) adult Rwandans consumed less than five servings of fruit or vegetables per day with an average of 0.6 servings of fruit and 1.0 servings of vegetables eaten per day. Less than 1% reported consuming no fruits or vegetables per day (0.3%). Table 7 presents salt, fruit, and vegetable consumption overall and by sex.

Table 7. Diet overall and by sex

Diet	Overall		Males		Females	
	% (95% CI)		% (95% CI)		% (95% CI)	
Salt Consumption						
Always or often add salt or salty sauce to food before eating or as they're eating	26.2	(24.8 , 27.6)	26.8	(25.0 , 28.7)	25.6	(23.6 , 27.8)

Always or often add salt or salty seasoning when cooking or preparing foods	33.4	(31.9 , 35.0)	33.6	(31.6 , 35.6)	33.2	(31.0 , 35.6)
Always or often eat processed foods high in salt	12.4	(11.4 , 13.5)	12.9	(11.5 , 14.4)	11.9	(10.5 , 13.5)
Fruit Consumption						
Average number of days per week fruits are consumed	2.7	(2.7 , 2.8)	2.7	(2.6 , 2.8)	2.8	(2.7 , 2.8)
Average number of servings of fruit consumed per day	0.6	(0.6 , 0.6)	0.6	(0.6 , 0.7)	0.6	(0.6 , 0.7)
Vegetable Consumption						
Average number of days per week vegetables are consumed	4.6	(4.6 , 4.7)	4.5	(4.4 , 4.5)	4.8	(4.7 , 4.9)
Average number of servings of vegetables consumed per day	1.0	(1.0 , 1.1)	1.0	(1.0 , 1.0)	1.1	(1.0 , 1.1)
Fruit and Vegetable Consumption						
Consume less than five servings of fruits OR vegetables per day	96.4	(95.7 , 96.9)	96.3	(95.4 , 97.0)	96.4	(95.3 , 97.2)
Consume no fruits and vegetables	0.3	(0.2 , 0.5)	0.3	(0.1 , 0.6)	0.3	(0.1 , 0.6)

4.5. Raised Blood Pressure or Hypertension

Overall, 63.4% of adult Rwandans reported ever having their blood pressure measured by a health care professional (59.1% for men, 67.4% for women). Approximately one in five adult Rwandans, 20.0%, reported that they had ever been diagnosed by a doctor or health professional with raised blood pressure or hypertension. Among those who reported a diagnosis, almost two out of five (37.2%) were currently on medication. Table 8 shows the rates of self-reported raised blood pressure or hypertension.

Table 8. Raised blood pressure/hypertension overall and by sex

Raised Blood Pressure/Hypertension	Overall		Males		Females	
	% (95% CI)		% (95% CI)		% (95% CI)	
Had blood pressure measured by doctor or health care professional	63.4	(62.0 , 64.8)	59.1	(57.1 , 61.1)	67.4	(65.3 , 69.4)
Diagnosed by doctor or health care professional with raised blood pressure/ hypertension	20.0	(18.3 , 21.8)	18.4	(16.4 , 20.6)	21.3	(18.8 , 24.0)
Currently taking medication for raised blood pressure/ hypertension	37.2	(32.4 , 42.1)	34.7	(29.0 , 40.8)	38.9	(32.0 , 46.3)

4.6. Physical Activity

Overall, adult Rwandans reported having an average of 2.1 days per week with 30 or more minutes of moderate physical activity. Men reported reaching this benchmark on 2.4 days per week while women reported 1.9 days per week. Table 9 shows the rates of self-reported raised blood sugar or diabetes.

Table 9. Physical activity overall and by sex

Physical Activity	Overall % (95% CI)	Males % (95% CI)	Females % (95% CI)
Average number of days per week with 30 or more minutes of moderate physical activity	2.1 (2.1 , 2.2)	2.4 (2.3 , 2.4)	1.9 (1.9 , 2.0)

5. Conclusions

NCDs and their associated risk factors have profound consequences on the individual and Rwandan society at large. The data presented in the Rwanda NCD MPS provide a strong foundation for the development of prevention and response strategies in Rwanda. Some key outcomes included:

- Approximately 5.4% of Rwandan adults reported being current tobacco users with 4.5% reporting current tobacco smoking and 1.6% reporting current smokeless tobacco use. Men were more likely to report any type of tobacco use than women. Overall, 23.0% of adult Rwandans reported exposure to tobacco smoke in their home while 14.5% reported exposure at work.
- Overall, two in five (43.8%) reported alcohol consumption in the past year, and 10.9% reported daily use. Approximately three out of ten adult Rwandans reported consuming alcohol in the past 30 days. Men were more likely to drink alcohol in the past 12 months, 30 days, as well as report higher frequency consumption.
- More than nine in ten adult Rwandans, 96.4%, reported consuming less than five servings of fruits or vegetables per day.
- More than one in three adult Rwandans (33.4%) reported always or often adding salt or salty sauces to food as they are cooking or preparing it.
- Overall, 20.0%, indicated ever being told that they have raised blood pressure or were hypertensive by a doctor or health professional, of which less than half (37.2%) reported taking medication for their raised blood pressure or hypertension.
- Overall, adult Rwandans reported averaging 2.1 days per week with 30 or more minutes of moderate physical activity.

Conclusions:

Findings from this survey help provide a national baseline on select NCD risk factors for Rwandan adults aged 18 years and older. Results will inform the Ministry of Health in Rwanda as they improve and enhance NCD prevention and response efforts. The timely reporting of MPS results such as these will also facilitate comparisons over time and across countries.

Limitations:

The main limitation of any MPS includes the population's access to a mobile phone. Therefore, the population who do not have access to mobile phones was not represented in this survey. The results of the MPS were based on self-reports and may be influenced by recall or social desirability bias.

6. References

1. World Health Organization. Noncommunicable diseases data portal: Rwanda country profile. Geneva: WHO; 2022. <https://ncdportal.org/CountryProfile/GHE110/Rwanda>
2. StataCorp. 2021. *Stata Statistical Software: Release 17*. College Station, TX: StataCorp LLC.